

for the purpose, the preparation ought to be allowed to become thoroughly saturated with the oil of turpentine; the time which it will take to do this will of course depend upon the size and thickness of the object treated. The principle involved in this method is the same as that applied in making balsam or damar preparations on slips for the microscope, only that after dehydration is effected oil of cloves is used to make the object transparent instead of turpentine, although the latter is also used. The preparation is then covered with a drop of balsam and the cover-glass put on, when you have a specimen that, with a little care, will last a lifetime. The Semper is simply the microscopic method adapted to large objects which could not be mounted upon slides, and I see no reason why they should not be equally as durable as microscopical balsam preparations. It is equally important that the strong alcohol should completely saturate the specimen, else the turpentine will not find its way into all parts of it so as to render it indestructible when dry. Two or three hours would probably suffice for the saturation with alcohol or turpentine of moderately large specimens. The hardening in the chromic acid solution would require from 12 to 24 hours, according to the size of the object. This method is also free from the objection which applies to Wickersheimer's, that there are no corrosive metallic poisons used.

By placing the vessel containing the preparation as immersed under an air pump, the penetration of the liquids will be facilitated.

NOTES ON A COLLECTION OF FISHES, MADE BY LIEUT. HENRY E. NICHOLS, U. S. N., ON THE WEST COAST OF MEXICO, WITH DESCRIPTIONS OF NEW SPECIES.

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During the autumn of 1880 a cruise along the west coast of Mexico and Central America was made by the U. S. Coast and Geodetic steamer Hassler. Lieut. Henry E. Nichols, the officer in command, took much pains to make collections of fishes whenever they were obtainable. As a result of his labors we have the small but extremely valuable collection noticed in the present paper. It will be observed that twelve of the specimens came from the Revillagigedo Islands, in the open sea to the westward of Mexico, a locality where no collections of fishes had been previously made by any one. Six of these specimens belong to species new to the fauna of North America.

We give an enumeration by localities of the species in the entire collection, with the number borne by each specimen on the records of the United States National Museum.

A.—Whaler's Bay, Guadalupe Island, Lower California.

1. PSEUDOJULIS MODESTUS (Girard) Gthr.
2. PSEUDOJULIS MODESTUS (Grd.) Gthr. (No. 28,391 U. S. Nat. Mus.)

B.—*Sulphur Bay, Clarion Island.*3. *CARANX ORTHOGRAMMUS* sp. nov. (No. 28,345 U. S. Nat. Mus.)

Allied to *Caranx ferdau* and *C. gymnostethoides*; species with nearly straight lateral line, many-rayed dorsal and anal, and feeble teeth.

Body elliptical, compressed, the back regularly but not strongly arched, the ventral outline forming a rather even but less convex curve. Head longer than deep, rather pointed in profile, its median ridge somewhat elevated. Mouth low, oblique, the maxillary extending to nearly opposite front of pupil, its length $2\frac{3}{4}$ in head; lower jaw slightly projecting.

Teeth all equally minute, in villiform bands on jaws, vomer, palatines, and tongue. Eye large, broader than preorbital, its diameter $1\frac{1}{2}$ in length of snout, $4\frac{2}{3}$ in head. Adipose eyelid little developed. Cheeks and temporal region with fine scales; rest of head naked.

Scales rather small, those below pectorals smaller; a naked area on breast, becoming wider forwards from base of ventrals. Lateral line almost straight, slightly undulated and curved upwards above pectorals, becoming straight by almost imperceptible degrees opposite lobe of anal. Greatest depth of the arch less than diameter of pupil; the length of straight part less than that of the curve. Plates developed only on the posterior third of the straight part; the plates small, with low keels, their spines little prominent; 15 to 18 plates developed, including small ones, in front of which are about 40 ordinary scales on the straight portion of the lateral line.

Spinous dorsal very small, of three weak spines slightly connected by membrane, the highest spine not longer than diameter of pupil (these spines, probably, more numerous and larger in young examples). Soft dorsal long and low, with slender rays; a well-developed scaly basal sheath anteriorly. Elevated rays in front a little more than one-third the base of the fin, a little more than half length of head; anal shorter than dorsal, its anterior lobe equally high, and with a similar basal sheath. Free anal spines obsolete in typical specimen. Caudal lobes moderate, equal, as long as head, their length equal to the depth of the fin from tip to tip. Pectoral fin falcate, its tip very slender, reaching eighth ray of anal, its length $2\frac{1}{2}$ in body. Ventrals short, $2\frac{1}{2}$ in head.

Head $2\frac{3}{4}$ in length to base of caudal; depth $3\frac{3}{4}$.

Fin rays: D. III–I, 32. A. II–I, 26.

Coloration in spirits, smutty olivaceous, everywhere irregularly clouded with darker, the belly scarcely paler than the back; opercular spot obsolete. Dorsal, anal, posterior border of caudal, and tips of ventrals blackish; fins otherwise dull olivaceous.

A single specimen of this species, 16 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico.

It is certainly very close to *Caranx ferdau* (Günther, Fische Sudsee,

ii, 134, taf. 87, 88), but it seems to differ in color and in the armature of the lateral line.

4. *CARANX LUGUBRIS** Poey. (No. 28,375 U. S. Nat. Mus.)

Body oblong-ovate, compressed, deep, the back elevated, but not arched. Profile gibbous from the occiput forward to above eye, thence straight and steep at a considerable angle to a point in front of nostrils, whence the snout again projects at a strong angle. Outline of back nearly straight from the occiput to the front of the second dorsal, thence declining regularly to the caudal peduncle. Ventral outline nearly straight from the lower jaw to the origin of the anal, the base of which is placed at a similar angle to that of the soft dorsal.

Head large, very deep, deeper than long; occipital ridge not sharp. Mouth large, the broad maxillary reaching to opposite front of pupil. Lower jaw strong, the chin projecting when the mouth is closed. Teeth in the upper jaw in a narrow villiform band, with an outer series of larger, conical teeth, six to eight in number on each side, subequal and regularly arranged. Lower jaw with a single series of teeth similar to the larger teeth of the upper jaw, a few smaller teeth intermixed with them. No differentiated canine teeth. Villiform teeth on vomer, palatines, and tongue. Gill-rakers rather long, close-set, three-fifths diameter of eye. Eye large, with a distinct adipose eyelid, its diameter equal to that of the broad preorbital, which is wider than the maxillary, $4\frac{1}{2}$ times in length of head.

Cheeks closely scaled; opercles mostly naked below; a few scales on snopercle and interopercle. Scales on body not very small; breast closely scaled. Lateral line with a moderate curve anteriorly, becoming straight at front of anal; the length of the arch being less than two-thirds that of the straight part; greatest depth of the arch about one-fifth its length. Armature of lateral line beginning at the curve; the plates rather large, very broad, twenty-eight in number. Fins with very few scales or none.

Spinous dorsal moderate, the spines rather strong, its last spine stout and free, nearly horizontal. Second dorsal falcate, the longest rays more than half the length of its base. Posterior part of the fin rather low, rising well above its low basal sheath of scales which terminates near the middle of the fin; anal similar to soft dorsal, its anterior rays more than half the base of the fin. Free anal spines moderate. Caudal lobes rather broad, equal, not very long, the upper as long as from snout to edge of opercle; depth of the fin from tip to tip, about equal to depth of head. Ventral fins short, not filamentous, as long as from snout to end of maxillary. Pectoral extremely long, falcate, reaching to the tenth plate of the lateral line, or about to seventh anal ray, its length $2\frac{3}{4}$ in that of body, less than the greatest depth of the body.

Fin rays: D. VII-I, 21. A. II-I, 18.

* *Caranx ascensionis* Günther, *Fische der Sudsee* ii, 132, taf. 85 = *Caranx ascensionis* Cuv. & Val. ix, 102: evidently not *Scomber ascensionis* Osbeck, which is pale in color, and with D. VIII-25; A. 25.

Head $3\frac{1}{2}$ in length to base of caudal; greatest depth $2\frac{2}{3}$.

Color sooty blackish, nearly uniform, the belly not paler than the back. A black spot at angle of opercle, none on pectoral. Ventrals, anal and dorsal wholly black, as are the shields of the lateral line.

The single specimen of this species (No. 28,385) 18 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico. It seems to be identical with the fish figured by Dr. Günther (Fische Sudsee, taf. 85) as *Caranx ascensionis*, from Kingsmill Island, but the original *Scomber ascensionis* of Osbeck is evidently a different species.

5. BALISTES MENTO sp. nov. (No. 28,387 U. S. Nat. Mus.)

Body oblong, elliptical, slightly heaviest forward; dorsal and ventral outlines similar, neither much arched. Body not strongly compressed, its greatest thickness a little less than half its greatest depth. Mouth very small, terminal, higher up than usual, nearly in the line of the axis of the body, the chin protruding beyond it; width of the mouth from angle to angle about equal to the diameter of the eye. Lower jaw the longer, its teeth slightly directed backward; upper jaw with its teeth directed slightly forwards, shutting outside of the lower teeth. Teeth pale brownish, somewhat unequal; lower teeth wedge-shaped, broadest and nearly truncate at tip; teeth of the upper jaw obliquely truncate, slightly emarginate, the outer angle pointed and projecting. About eight teeth in the outer row; the mouth so closely shut that the inner row cannot be seen.

Eye small, high and well back, its diameter contained nearly twice in the interorbital width, 3 in snout. A groove in front of eye below the nostrils, about as long as the diameter of the eye. Five narrow grooves on the cheek below the eye, extending from near the mouth backward toward the base of the pectoral.

Height of gill-opening slightly greater than diameter of eye, its lower edge opposite middle of pectoral.

Scales of body comparatively small, not very rough. Scales of belly somewhat reduced in size, arranged in oblique series running downward and backward from the pectoral region, these forming a contrast in direction with the scales of the sides. Scales on caudal peduncle without keel or spines, similar to those on rest of body; scales on posterior portion of sides slightly carinate, forming low ridges along the rows of scales. Gill-opening surrounded by small scales and without larger plates.

First dorsal spine very robust, placed somewhat behind eye, its height a little more than twice diameter of eye, the deep dorsal groove as long as the spine. Second spine short and slender, its length about equal to diameter of eye. *Third dorsal spine wholly wanting.*

Soft dorsal rather high, its longest rays more than half the length of the base of the fin, $1\frac{2}{3}$ in head; anal similar, its base a little shorter, a few series of small scales covering the base of each fin; caudal moderate, lunate, its depth from tip to tip more than its length, and $1\frac{1}{4}$ times

in length of head. Caudal peduncle subterete, deeper than broad. Ventral spine slightly movable. Pectoral short, rounded, less than half length of head.

Head $3\frac{1}{2}$ in length; depth $2\frac{3}{5}$.

Dorsal rays II-I, 29. Anal I, 26.

Lat. 1. 37; 23 scales in an oblique series upward and forward from front of anal.

Coloration in spirits, dark olive above, rather pale below, the skin between the scales somewhat darker; scaly basal part of dorsal and anal abruptly black; membrane of these fins yellowish, the tips dusky. Scaly base of caudal dark brown, the medial part lighter brownish; a lunate band at tip yellowish; pectorals olivaceous.

One specimen of this species, $10\frac{1}{2}$ inches long, was taken by Lieutenant Nichols at Clarion Island. It differs from all the known species of *Balistes* in the presence of but two spines in the dorsal. If this be not an accidental variation, the species should probably be taken as the type of a distinct genus. The small high mouth gives a somewhat peculiar physiognomy.

C.—*Braithwaite Bay, Socorro Island. (Taken with hook.)*

6. EPINEPHELUS SELLICAUDA Gill. (28,213.)
7. EPINEPHELUS SELLICAUDA Gill. (28,237.)
8. DERMATOLEPIS PUNCTATUS Gill. (28,214.)
9. DERMATOLEPIS PUNCTATUS Gill. (28,223.)
10. PIMELEPTERUS LUTESCENS sp. nov. (No. 28,371, U. S. N. M.)

Body oblong-elliptical, robust; the dorsal and ventral outlines moderately and nearly equally arched. Head bluntish; the profile evenly curved, without depression in front of the eye; the preorbital region less gibbous than in *P. bosci*. Mouth terminal, the lower jaw slightly the shorter, the broad maxillary reaching to opposite the front of the eye, its width about equal to that of the preorbital.

Teeth in both jaws broad, rounded or subtruncate, in single rows, the horizontal roots longer than the crown, but not twice as long; about 36 teeth in each jaw. Behind the large teeth in each jaw is a band of rasp-like asperities. Gill-rakers short.

Preopercle with its angle rounded and membranaceous, the vertical limb straight and minutely serrulate. Cheeks with four rows of large scales, besides several series of smaller ones. Preorbital, jaws, snout, rim of eye, and rounded part of preopercle naked; the head otherwise closely scaly.

Scales on body rather small, firm, smoothish; those on breast smaller; fins, as usually, with the soft parts covered with small scales.

Dorsal spines rather high and strong, the middle ones highest, higher than the soft rays, nearly twice the height of the last spine, and half the length of the head, $3\frac{2}{5}$ in greatest depth of body. Soft dorsal rather high, not at all falcate, the first rays two-fifths the length of the head.

Anal fin similar, shorter and higher, the spines graduated, the longest rays more than half length of head.

Caudal wide, moderately forked, the lobes equal, the longest a little longer than head; the depth of the fin, from tip to tip, about equal to greatest depth of body. Pectorals short, slightly longer than ventrals; as long as from snout to edge of preopercle. Ventrals placed well behind pectorals, not reaching vent.

Head $3\frac{3}{4}$ in length; depth $2\frac{1}{4}$.

Dorsal rays, XI, 11; Anal, III, 11. Scales, 12-67-22.

Coloration in spirits nearly uniform light grayish, without distinct markings; golden yellow in life, according to Lieutenant Nichols; very faint darker streaks present along the rows of scales. Preorbital, sub-orbital, and preopercle bright silvery; lower jaw silvery; both jaws dusky at tip. Fins all pale. A very obscure darker blotch in front of base of pectoral.

One specimen, about 15 inches in length, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It differs from *P. bosei*, in form, in color, and in the greater development of nearly all the fins.

11. *CARANX MELAMPYGUS* Cuv. & Val. (No. 28,355 U. S. N. M.)

Body oblong-ovate, compressed, the back arched, the profile not steep, the curve from snout to dorsal being a nearly regular arc; ventral outline nearly straight from the chin to front of anal, where an angle is formed with the ascending base of the anal.

Head moderate, compressed, not blunt in profile, the occiput and inter-orbital region elevated and considerably carinated. Mouth moderate, low, oblique, the lower jaw prominent, scarcely projecting beyond upper; maxillary barely reaching to opposite the front of the small eye. Upper jaw with a band of villiform teeth, in front of which is a row of strong teeth, about ten on each side, the anterior largest, larger than in most species, but hardly canines. Lower jaw with a single row of rather large teeth, irregularly placed, much smaller than the larger teeth of the upper jaw; villiform teeth on vomer, palatines, and tongue. Eye small, placed high and far back; adipose eyelid small. Diameter of eye 2 in length of snout, $1\frac{1}{4}$ in the depth of the broad preorbital, $2\frac{1}{2}$ in the post-orbital part of head, and 2 in interorbital area. Cheeks and upper part of opercles with small scales; rest of head naked. Gill-rakers long and strong, as long as eye.

Scales rather small; breast closely scaled; lateral line not strongly arched, becoming straight opposite front of anal, its curved part $1\frac{2}{3}$ in length of straight part. Plates on anterior portion of straight part scarcely different from ordinary scales; those on posterior portion moderate, with high keels and appressed spines; 37 plates in all, counting from beginning of straight part.

Spinous dorsal moderate, the spines slender, rather high. Procnubent dorsal spine obsolete. Soft dorsal low, falcate in front, the longest ray little more than half the base of the fin, or $1\frac{1}{2}$ in length of head.

Anterior part of the fin with a distinct scaly basal sheath, which becomes obsolete at about the 14th ray. Anal fin similar to soft dorsal, a little shorter and lower, its scaly sheath more developed; free anal spines moderate. Caudal fin widely forked, its lobes subequal, $1\frac{1}{2}$ in head; distance from tip to tip more than the length of either lobe. Pectorals long and falcate, their tips reaching sixth anal ray, longer than head, and a trifle less than greatest depth of body. Ventrals short, one-third length of pectorals.

Coloration in spirits olivaceous; dark above; pale below, but nowhere silvery; top of head clear olivaceous; opercular spot obsolete; lower jaw soiled golden; no pectoral spot; base of pectoral somewhat dusky; small irregular dark brown spots, smaller than the pupil and irregular in size, scattered without order over the body, rather most numerous about the pectorals. Caudal fin dusky, especially on its posterior edge; dorsal and anal dusky, their lobes black; ventrals dusky at tip; pectorals olivaceous.

Head $3\frac{1}{2}$ in length (without caudal); greatest depth, $2\frac{3}{4}$; pectoral, $2\frac{1}{5}$; length of type, 20 inches.

Fin rays: D. VIII-I, 22. A., II-I, 19.

A single example of this species was taken by Lieutenant Nichols, with a hook, in Braithwaite Bay, Socorro Island, off the west coast of Mexico. It agrees very closely with the description and figure of *Caranx melampygus* given by Günther (Fische Sudsee ii, 133, taf. 86.) 12. PLATYGLOSSUS NICHOLSI sp. nov. (No. 28,218 U. S. N. M.)

A species of the ordinary type, without sharp markings of any kind. Body rather deep; the profile steep, evenly curved; the snout moderately pointed. Teeth strong, the posterior canines especially so. Head entirely naked; scales on breast not much reduced. Dorsal spines very slender, flexible. Pectoral fin $1\frac{3}{5}$ in length of head, reaching as far as the slender tips of the ventrals. Caudal fin rounded, its angles not at all produced.

Coloration in spirits, plain olivaceous above, sides brownish, belly paler; an obscure dusky bar across middle of spinous dorsal and extending down the sides; some of the scales of back with dark lines. Soft dorsal and anal fins with not very numerous small, round dark spots, especially posteriorly; otherwise plain; spinous dorsal dusky. The coloration may have been bright in life, but there could never have been any sharp markings.

Head $3\frac{1}{2}$ in length; depth $3\frac{1}{2}$.

D. IX, 12. A. III, 11. Scales 2-28-8.

This species is known to us from a single example, $10\frac{1}{2}$ inches long, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It is readily distinguished from the only two members of the genus thus far discovered on the western coast of tropical America, *P. dispilus* Günther, and *P. semicinctus* (Ayres). It is impossible, from descriptions alone, to compare it satisfactorily with the numerous West Indian

and East Indian species of the genus, but, as all are local in their range, ours is probably a species different from any of them.

D.—*San Blas, Mexico.*

13. POMADASYS FURTHI (Steindachner.) J. & G. (28,225.)
14. LUTJANUS PRIETO Jor. & Gilb. (Mss.). (28,253.)
15. CENTROPOMUS PEDIMACULA Poey.
16. GERRES AXILLARIS Gthr. (28,255.)

E.—*Acapulco, Mexico.*

17. EPINEPHELUS ANALOGUS Gill. (28,235.)
18. POMADASYS LEUCISCUS (Gthr.) J. & G. (28,257.)
19. LUTJANUS CAXIS (Bloch.) Poey. (28,254.)
20. CYNOSCION RETICULATUM (Günther) J. & G. (28,250.)

F.—*Porto Escondido, Mexico.*

21. PIMELEPTERUS ANALOGUS Gill. (28,270.)

This species is closely related to *P. boscii* Lac., differing in the larger scales and greater depth of the body.

22. CARANX CABALLUS Gthr.
23. TRACHYNOTUS FASCIATUS Gill.
24. MUGIL BRASILIENSIS Ag. (28,244.)

G.—*Salina Cruz, Mexico.*

25. CENTROPOMUS ROBALITO Jor. & Gilb. (Mss.) (28,245.)
26. GERRES RHOMBEUS C. & V.
27. DORMITATOR MACULATUS (Bloch) Gill.
28. PHILYPNUS LATERALIS Gill. (28,252.)
29. PHILYPNUS LATERALIS Gill. (28,269.)
30. CHANOS SALMONEUS (Forst.) C. & V. (28,240.)

H.—*La Union, San Salvador.*

31. CYNOSCION SQUAMIPINNE (Günther) Streets. (28,260.)
32. SCLENA ALUTA* sp. nov. (No. 28,129 U. S. N. M.)

Allied to *Sciæna chrysolenca* (Günther).

Form rather elongate, the back a little elevated and compressed; caudal peduncle especially long and slender. Head rather broad above the eyes, somewhat depressed, so that the anterior profile is a little concave, in front of which the snout is rather abruptly truncate. Interorbital space a little broader than the large eye, the diameter of which is about equal to the length of the snout, and contained about four times in the length of the head. Width of preorbital two-fifths the diameter of the eye. Preopercle strongly serrated, the three lowest serræ radi-

*αλουτος, unwashed.

ating, the lowest and largest one turned downward and forward. Lower jaw included, considerably shorter than upper. Snout scarcely projecting beyond premaxillaries. Mouth nearly horizontal; premaxillary much below the level of the eye; maxillary extending to just beyond middle of eye. Teeth in both jaws in narrow villiform bands, the outer teeth in the upper jaw somewhat enlarged; those in the lower jaw all small. Sides and top of head somewhat cavernous, the surface yielding to the touch. Gill-rakers shortish, rather slender, about as long as pupil. Pseudobranchiae large.

Dorsal fin divided nearly to base, the spines not very high, rather flexible, the longest little more than half length of head; second spine a little stouter than third, and nearly as high. Second dorsal rather low. Second anal spine strong, about half length of head, three-fourths height of the soft rays; distance from front of anal to caudal $1\frac{3}{4}$ in length of body; distance from vent to anal a little more than half length of second anal spine. Caudal fin long, double truncate, the middle rays produced, as long as from snout to edge of preopercle; caudal peduncle (from end of anal) $1\frac{1}{2}$ in head; anal ending in advance of end of dorsal, its first spine in advance of middle of soft dorsal. Ventrals long, the second ray filamentous, reaching vent. Pectorals rather short, as long as caudal.

Scales large, those on breast not much smaller. Soft parts of vertical fins scaly toward the base.

Lower pharyngeals narrow, with small, slender, pointed teeth, those of the series on the inner edge of the bone much enlarged, also very slender.

Head $3\frac{2}{5}$ in length to base of caudal; greatest depth, $3\frac{1}{4}$.

D. X-I, 18. A. II, 8. Lat. 1, 44; 5 scales in a vertical series from front of dorsal to lateral lines.

Color light reddish brown, dingy with dark punctulations. Ground color a light coppery shade, little silvery; each scale with many dark points and a smutty edging; the general hue the same above and below; no distinct markings. Preorbital of a soiled silvery. Fins similarly dusky, the caudal yellowish, the anal almost black. Inside of opercle dusky.

This species is known to us from one specimen, $7\frac{1}{2}$ inches in length, numbered 28,129 on the National Museum Register. It was collected at La Union, on the Gulf of Fonseca, in San Salvador, by Lieut. H. E. Nichols.

33. *MUGIL BRASILIENSIS* Ag. (29,644.)

34. *ÆLURICHTHYS PANAMENSIS* Gthr. (28,192.)

INDIANA UNIVERSITY, November 5, 1881.